REMARKS

Summary

This Amendment is responsive to the Office Action mailed on October 18, 2005. Claims 11-13, 28-30, 33, 36, 47-49, 64-66, 69, and 72 are amended. Claims 1-72 are pending.

Claims 36 and 72 are allowed. The Examiner has indicated that claims 9-14, 16, 22, 26-32, 45-50, 52, 58, and 62-68 contain allowable subject matter.

The specification is amended herein to correct errors in the Summary of Invention section and to conform to the language of the amended claims, as discussed below.

Claims 11-13, 298-30, 47-49 and 64-66 have been rejected as being indefinite. Claims 11-13, 28-30, 47-49, and 64-66 are amended herein to overcome the indefiniteness rejection. Withdrawal of this rejection is respectfully requested.

Claims 1-8, 15, 17-21, 23-25, 33-35, 37-44, 51, 53-57, 59-61, and 69-71 were rejected under 35 U.S.C. § 102(b) as being anticipated by Xu (US 6,674,861).

Applicant respectfully traverses these rejections in view of the following comments.

Discussion of Amended Claims

Claims 11-13, 28-30, 47-49, and 64-66 are amended herein to overcome the indefiniteness rejection. Withdrawal of this rejection is respectfully requested.

Claims 33, 36, 69 and 72 are amended to correct an error in the claims. In particular, the claims are amended to clarify that the embedded scrambled data sequence is selected from a plurality of scrambled data sequences generated by scrambling the watermarking data with each code from a code set, based on a comparison with a host signal (rather than "codes" as erroneously indicated in the original claims). This language describes how the embedded scrambled data sequence which is being extracted is selected at the embedding side, which corresponds to the embedding method of claim 17. This error is apparent from the specification, and the corresponding description in the Summary of Invention section is amended accordingly.

Discussion of Xu

Claims 1-8, 15, 17-21, 23-25, 33-35, 37-44, 51, 53-57, 59-61, and 69-71 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Xu. This rejection is respectfully traversed. An anticipation rejection requires that each and every element of the claimed invention as set forth in the claim be provided in the cited reference. See *Akamai Technologies Inc. v. Cable & Wireless Internet Services Inc.*, 68 USPQ2d 1186 (CA FC 2003), and cases cited therein. As discussed in detail below, Xu does not meet the requirements for an anticipation rejection.

Xu discloses digital audio watermarking using content-adaptive, multiple echo hopping. A digital audio signal 100 is provided as an input to an audio digest module 130, an audio segmentation module 140, and an echo embedding module 180. Using the digital audio signal 100, the audio digest module 130 produces a watermark key 108 that is provided as input to encryption module 120. The watermark key 108 is an audio digest signal created from the original audio signal 100. Predefined watermark information 102 is also provided as an input to the encryption module 120. The watermark information 102 is encrypted using the watermark key 108 and provided as an input to echo-hopping module 160 (Col. 6, line 57 to Col. 7, line 3).

The audio segmentation module 140 segments the digital audio signal 100 into two or more segments or frames. The segmented audio signal is provided as input to a feature extraction module 150. Feature measures are extracted from each frame to represent the characteristics of the audio signal in that frame. The extracted features from each frame of digital audio data 100 are provided as input to the classification and embedding selection module 170. This module 170 also receives classification parameters 106 and embedding schemes 104 as input. Based on the feature measures, each audio frame is classified into one of the pre-defined classes and an embedding scheme is selected (Col. 7, lines 4-26).

The output of the classification and embedding scheme selection module 170 is provided as an input to the echo-hopping module 160. Each embedding scheme is tailored to a class of the audio signal. Using the selected embedding scheme, the watermark is embedded into the audio frame using a multiple-echo hopping process. This produces a particular arrangement of echoes

that are to be embedded in the digital audio signal 100 dependent upon the encrypted watermark produced by the module 120. The echo hopping sequence and the digital audio signal 100 are provided as an input to the echo embedding module 180. The echo embedding module 180 produces the watermarked audio signal 110 by embedding the echo hopping sequence into the digital audio signal 100. This process produces two outputs: a watermark key 108 digested from the original audio signal 100 and the final watermarked audio signal 110 (Col. 7, lines 27-43).

Corresponding techniques are disclosed for detecting watermarks embedded using this process (Col. 10, line 25, et seq.)

As discussed in detail below, the techniques disclosed in Xu are far removed from the watermarking techniques claimed by Applicant which employ host-matching codes.

Rejection of Claims 1 and 37

Applicant's claims 1 and 37 are drawn to a method and apparatus for embedding watermark information, respectively. A host signal is provided. Data to be embedded in the host signal is also provided. Distinct input data strings of the data are associated with distinct code sets. Codes from the associated code sets are selected to represent the input data strings based on an analysis of the host signal. The codes which are selected to represent the input data strings are embedded into the host signal to provide a watermarked signal.

Accordingly, with Applicant's claimed invention as set forth in claims 1 and 37, a set of codes are embedded into the host signal; these codes are selected, based on an analysis of the host signal, from a set of associated codes that represent the input data strings. The selection of codes based on an analysis of the host signal does not change the embedding algorithm; rather, it changes the selected codes that will subsequently be embedded.

In contrast, the selection process in Xu selects between different embedding algorithms based on an analysis of the host signal (Col. 7, lines 18-32). Xu also requires a training process for each category of audio signal to define embedding schemes suitable for that signal (Col. 9, lines 40-47). No such training process is required with Applicant's claimed invention, since the embedding scheme is not or need not be changed.

In sum, Xu analyzes the host signal to determine which of several different embedding algorithms are best suited for use in embedding data into the host signal. Applicant's claimed invention analyzes the host signal to determine which code that represents the data to be embedded is best suited for embedding into the host signal.

Xu does not disclose or remotely suggest any type embedding scheme using host-matching codes, in which codes are embedded into the host signal to represent the data to be embedded. In addition, Xu does not disclose or remotely suggest selecting a code to represent the data to be embedded based on an analysis of the host signal, as claimed by Applicant.

Rejection of Claims 17 and 53

Applicant's claims 17 and 53 are drawn to a method and apparatus for embedding watermark information, respectively. A host signal is provided. Data to be embedded in the host signal is also provided. The data to be embedded is scrambled with each code from a code set to provide a plurality of scrambled data sequences. Each scrambled data sequence is compared to the host signal. A scrambled sequence is then selected which is a best match to the host signal. This best matched scrambled data sequence is embedded into the host signal to provide a watermarked signal.

Accordingly, with Applicant's claimed invention as set forth in claims 17 and 53, the data to be embedded is scrambled several times. In particular, the data is scrambled with each code from a code set to provide a plurality of scrambled data sequences. In contrast, in Xu, the watermark information 102 is scrambled (encrypted) once, at encryption module 120, and this encrypted data stream is provided as an input to the echo hopping module 160 (Col. 6., line 66 through Col. Line 3).

Further, with Applicant's claimed invention, each of the plurality of scrambled data sequences are compared to the host signal to determine which scrambled data sequence is a best match and the best matched scrambled data sequence is embedded into the host signal. In Xu, no such comparison takes place, since only a single scrambled data sequence is output from encryption module 120.

Xu does not disclose or remotely suggest scrambling the data to be embedded with each code from a code set to provide a plurality of scrambled data sequences. Further, Xu does not disclose or remotely suggest comparing each of said plurality of scrambled data sequences to the host signal and selecting a scrambled sequence which is a best match to said host signal for embedding into the host signal, as claimed by Applicant in claims 17 and 53.

Rejection of Claims 23 and 59

Claims 23 and 59 are drawn to methods and apparatus for recovering embedded watermarking data. The recovery techniques set forth in claims 23 and 59 are analogous to the embedding techniques discussed above in connection with claims 1 and 37. A watermarked signal is received and embedded codes are extracted therefrom. The extracted codes are interpreted to recover the watermarking data. Each code represents an input string of the watermarking data, each code being selected from a code set associated with the input data string based on an analysis of a host signal to be watermarked.

Accordingly, the arguments set forth above in connection with claims 1 and 37 apply to claims 23 and 59. In particular, Xu does not disclose or remotely suggest that a code is selected from a code set associated with the input string of watermarking data based on an analysis of the host signal as claimed by Applicant and discussed in detail above.

Xu discloses that the echo detecting module detects any echoes present in the currently processed audio frame. The detected echoes are provided as input to the code-mapping module 420. The code-mapping module also receives as input the embedding schemes 104 and produces the encrypted watermark (Col. 10, lines 42-57).

Accordingly, in Xu, the code-mapping module is used to determine which embedding scheme was used to embed the data based on the detected echoes.

Accordingly, Xu does not disclose or remotely suggest extracting embedded codes from a host signal which codes represent an input string of watermarking data and interpreting these extracted codes to recover the watermarking data, as claimed by Applicant.

The foregoing arguments apply equally to dependent claims 4 and 40.

Rejection of Claims 33 and 69

Claims 33 and 69 are drawn to methods and apparatus for recovering watermarking data, respectively. The recovery techniques set forth in claims 33 and 69 are analogous to the embedding techniques discussed above in connection with claims 17 and 53. A watermarked signal is received at a decoder and an embedded scrambled data sequence is extracted from the watermarked signal. A plurality of scrambled data sequences are generated at the decoder. The extracted scrambled data sequence is compared with the plurality of scrambled data sequences generated at the decoder. It is then determined whether any of the scrambled data sequences generated at the decoder match, within predefined parameters, the extracted scrambled data sequence. The embedded scrambled data sequence is selected (at the encoding side) from a plurality of scrambled data sequences generated by scrambling the watermarking data with each code from a code set, based on a comparison with a host signal

Accordingly, the arguments set forth above in connection with claims 17 and 53 apply to claims 33 and 69. In particular, Xu does not disclose or remotely suggest that the embedded scrambled data sequence is selected for embedding into the host signal from a plurality of scrambled data sequences generated by scrambling the watermarking data with each code from a code set, based on a comparison with a host signal as claimed by Applicant and discussed in detail above in connection with claims 17 and 53.

Further, Xu does not disclose or remotely suggest generating a plurality of scrambled data sequences at the decoder for comparison with the extracted data sequence to determine if any of the scrambled data sequences at the decoder match the extracted data sequence as claimed by Applicant. In contrast with Applicant's claimed invention, Xu recovers the encrypted watermark by detecting the echoes and determining the embedding scheme as discussed above, and then simply decrypts it using a watermark key 108 (Col. 9, lines 55-63; Fig. 4).

Xu does not disclose or remotely suggest generating a plurality of scrambled data sequences at the decoder for comparison with the extracted scrambled data sequence to determine whether any of the scrambled data sequences generated at the decoder match, within

predefined parameters, the extracted scrambled data sequence, as claimed by Applicant.

The foregoing arguments apply equally to dependent claims 19 and 55.

As Xu does not disclose each and every element of the invention as claimed, the rejections under 35 U.S.C. § 102(a) are believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra.*

Applicant respectfully submit that the present invention is not anticipated by and would not have been obvious to one skilled in the art in view of Xu, taken alone or in combination with any of the other prior art of record.

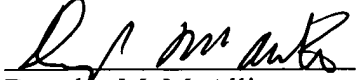
Further remarks regarding the asserted relationship between Applicant's claims and the prior art are not deemed necessary, in view of the foregoing discussion. Applicant's silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Withdrawal of the rejections under 35 U.S.C. § 102(a) is therefore respectfully requested.

Conclusion

The Examiner is respectfully requested to reconsider this application, allow each of the pending claims and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicant's undersigned attorney.

Respectfully submitted,



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